



SMART CITY DEVELOPMENT

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ABSTRACT

The vision of this paper compile the development of infrastructure & smart urban in India. The analysis over the approach of smart city centers to an action of line for implication of urban planning serving to the sectors of infrastructure, significantly impacts the other factors such as social environmental & structural economy, focusing into improvements for future scenarios. An urban moment where India heads for a modernity globalization and power of economic movement.

The spatial scheduling relies on particular factors for example Social network, information & Communication technology which effects on urban fabrication etc. The conceptualization of smart city clutches various definitions resting on word "smart"; omnipresent city, rational city, digital city, comprehending city & knowledge city. Smart city comprises of many definitions in own words of each person defining smart city. No certain definition has allotted for it. The common terminology such as Digital city and Smart city are used to direction city smartness. A smart city enhances the life of citizens with an ease for their routine work, providing efficient, reduced cost & a direct interaction with urbanite or metropolitan.

Paper elaborates about the benefits to economy, implementation cost & various confrontations towards Smart city. Building a smart city is another step towards generation of urbanization developing the efficiency, authenticity & security city. New era has caught up with a new idea "SUSTAINABLE URBAN DEVELOPMENT" and this idea adds a new gateway to urbanization which needs to update existing cities.

KEYWORDS: Smart urban development, Digital city, ICT, Economic, Social.

1. INTRODUCTION

The definition of a city can be exclaimed as smart where there are investments in human capital, social and modern communication infrastructure and in a quality of life managing the natural resources.

In earlier centuries like eighties & nineties advance technology and growth of economy presented a well being increased, especially in urban centers. This stimulated the urbanization stepping into escalating abandonment rural areas into bigger cities & metropolis. In that terms provide & facilitating many opportunities having positive as well as negative effect at global state.

With a prompt urbanization it includes the rapid demand for resources like energy, education, health care, sanitation & water.

This accentuates the demand to consume it, the resources conveniently or a smart solution of way developing the city that appropriate the needs of city residents. Talking about the contribution of smart city to global it ensures an improvised governance, and good management of infrastructure such as transportation, energy, water and housing to a higher quality of life.

Cities can be blueprinted, designed, constructed and operated more integrated as retort of political power, education, economy and sustainable development need. In other words smart city goals to reduce the difficulties, challenges city faces.

There are some countries which are showing interest in developing the cities of India to be a smart city. For example Israel, France, Spain, Sweden, Singapore, Japan, USA, Germany. These different countries are helping different states to develop their city into a smart city.

The migration of people from rural to urban is rapid. This rapidity can cause the population to double in coming 20, 30 years. This time is to deal with the rapid urbanization and opening of new different modes to enhance complexity, efficiency and to reduce the savages and maintain the quality of life in urban sectors and organization.

The collaboration of infrastructure and business services would improvise the efficiency of city.

The applying of smart services and smart solution also requires the proper adaptation and effectively used.

Smart city isn't a science fiction, a long chain of analytics, data, software, mobile applications, metropolis, sensors, tracking, social media products and many such tools uses to maintain and define it.

Many issues that smart city can heal any are there such as poverty and environ-

mental disasters, it's an advance communication system along with a warning system.

Global phenomenon has a fast urbanization.

In human history the year 2008 was having the more urban dwellers than rural dwellers, and the way it's preceding this is not going to be reversed.

2. THEMES RELATED TO SMART CITY

A. Smart City Mobility

There should be smart improvised mobility in city. Due to increased number of population smart transportation should be applied for ease of availability. More efficient and intelligent transportation systems are needed. Exploiting networks for efficient movement of vehicles, citizens and goods, to reduce interlocking and congestions on roadways. New 'social' services such as car sharing, car asseting, and car-bike combinations.

B. Smart Economy

Global as well as regional competitiveness should be maintained. Entrepreneurship & Innovation Momentum leads to successive and healthy economy. High Levels of Productivity and marketing in different sectors of business. Fast Broadband access availability for all citizens and businesses for services opportunities.

Autonomous location, maintaining population in rural areas.

Electronic marketing work forms (e.g., e-banking, e-shopping, e-reservations)

C. Smart Living

Providing a sustainable and challenge free Better Quality of Life. Few Social Aspects to be considered such as Education, healthcare, Public Safety, Housing.

Passage to high-quality healthcare services e- health records management.

Housing automation, smart housing and smart building services.

Access to social and government aided services of all kinds.

D. Smart Governance

1. Involved Decision Making.
2. Citizen and social service.
3. Having transparency in working.
4. Inclusion of democratic processes.

Collaborating with governmental organizations & administrations and improvising access of community to serv

E. Smart People

Investing in socially active human capital to know the provided accessibility provided by the government. Literate, Creative and qualified Citizenry who will be able to utilize the ICT based smart services.

Providing & delivering more frequent and reliable educative system in both rural as well as urban.

e-educative system solutions providing a remote teaching & learning collaboration to citizens for being better informed.

F. Smart Environment

Maintaining pollution control and using Sustainable Technologies for betterment of human life and environment.

Minimizing energy consumption by using novel techno innovations and market-energy conservation and material re-use.

3. INDIAN UNDER CONSTRUCTION SMART CITIES

India is a developing country having a large population in various states. Government is trying to fulfill the needs of citizens in accordance to their resident transportation amenities needed. Following are the cities which have taken a step towards a new age of living lifestyles with ease of everything.

A. GIFT city

Gujarat International Finance Tec-city.

GIFT city is an under construction central business district which is situated between Ahmedabad and Gandhinagar in Gujarat. It provides physical infrastructure like water, gas, electricity, roads, district cooling, telecoms and broad band etc, so finance tech firms can resettle their operations there from Gurgaon, Mumbai, Bangalore etc, where infrastructure is either imperfect or very over-priced.

The location is 18 km from Sardar Vallabhbhai Patel International Airport and 8km from Gandhinagar. It is also close to NLU Gujarat and IIT Gandhinagar.

Area – 3.99 sq.km (1.54 sq.mi)
Altitude- 640m
Co-ordinate-23.1596 °N ; 72.6845° E
District- Gandhinagar
State- Gujarat ; country- India
Water body- Sabarmati river
Target completion year – 2020

UTILITIES:

During the vibrant Gujarat Global Investor Summit 2007 the idea of GIFT was developed.

Electricity: The electricity supply is reliable enough that only 5.3 minutes of outage per year is expected.

Piped Gas: Every house and building will be getting natural gas via pipes which is safer and cheaper than cylinders.

District Cooling: It is a centralized cooling system which will be provided in the entire city.

Solid Waste Management: Waste will be sucked automatically via underground pipes at speed of 90km/hr (56mph) & treated through plasma gasification.

Transportation: Gift aims at providing a transportation network that gives easy and speedy mobility; all this would be achieved by:

1. Providing a walk to work concept as a part of urban planning between private and public transport.
2. Providing a multimodal mix of transport for (intercity) transport & (intra) city transport.
3. Using electric personal rapid transit system within city.
4. Gift will also have its own metro station.

GIFT CITY HIGHLIGHTS

- India's first international financial 'smart city'
- Strategically located between Ahmedabad and Gandhinagar
- State-of-art infrastructure at par with global standards
- It will target 8-10% of financial services potential in India
- Will create of 1 million direct & indirect jobs
- Up to 90 million sq.ft. of real estate office and residential space
- Construction began in 2011 and is expected to be completed in the next ten years
- Few towers are already completed

Fig. 4 Gift City Features

B. Dholera

There is a small village situated in a vast low lying ecological area off the gulf of khambhat in Gujarat known as dholera . There are total 22 villages involved in planning of dholera smart city including the village dholera. For most of the year this region remains submerged under the sea.

The cost of the dholera smart city is expected to be around US \$ 9 to 10 billion. 10% of this amount will be contributed by Indian state and Japanese corporations such as Hitachi, Toshiba, Tokyo electric power company, etc and the rest is expected to come from private sector. At present there is 67% agricultural land but the smart city will include only 12%.

The plan is to be completed by the year 2040 which is proposed to be built in three phases. The kalpsar mega dam project will be used to fulfill the demands for fresh water and electricity. A sea port will be developed to encourage the industrial trade and the global business will be supported by the construction of an international airport. Dholera will also be provided with a rail link to its nearest city which is situated about 100km to its north i.e. Ahmedabad. This new smart city is supposed to increase economic growth in the region, producing 0.8 million jobs and providing support to 2 million people by the year 2040.

The smartness of dholera city is presented via many features such as connected homes, green residential open spaces, big malls and market places, new technology mass rapid transit system i.e. ARTIST2WIN, 2013. Infrastructure facilities such as electricity water etc. will be connected to individual homes through an automatic metering system and facilities such as signals for land line, broadband, entertainment channel, video on demand etc. will be provided by a fiber to home concept to all individual homes.

4. SMART INFRASTRUCTURE COMPONENTS

Infrastructure is the groundwork for development of smart city. Cloud computing technologies offer a good solution for cities to unite their physical infrastructure. Smart city infrastructure can classify into two categories 1) Physical 2) Digital.

A. Physical Infrastructure

1) **Smart Buildings:** Buildings play a vital role in a smart city. It acts like a basic building block for a city. Providing its citizens with comfort and security are a few of them.

A Smart Building combines the different physical systems present in the building in a smart way to ensure that all the other systems in a building are acting together in an efficient and optimized manner.

These systems can improve building energy efficiency, decrease wastage, and guaranty optimum usage of water with operational effectiveness and satisfaction of the occupant. These building solutions can save as much as 40% of energy usage, 30% of water usage and reduce the overall maintenance for the building by 10%-30%.

2) **Smart Mobility and Transport:** Smart Mobility and Transport can be best described as an approach to reduce congestion and give you greener, faster and most importantly cheaper option for transportation. Most management systems use data collected from various sources to know about the mobility pattern in order to help optimize traffic conditions in a calm manner. Smart mobility and transport systems can be divided into the following areas: 1)

Mass Transit 2) Individual Mobility and 3) Intelligent Transport Systems.

a. Mass Transit- Mobility inside cities has to adapt and become smarter to handle the rapidly growing population. Developed nations emphasize on subway and train transport within the city.

BRT (Bus Rapid Transit) is a perfect example of mass transit which made travelling through buses highly efficient.

b. Individual Mobility- Recently there's been a massive change in individual mobility from cars towards transportation system design which features carpooling, bicycles and lately on-demand transportation is renowned.

Applications like Uber and Ola match drivers and passengers travelling in same route in less time, thus improve accessibility for carsharing.

Cities like Beijing and Shanghai are introducing bicycle lanes again to support bicycles.

c. Intelligent Transport System- ITS fuses all the multimodal transport facilities in a city, including both mass transit and individual mobility, in an apt manner. ITS normally embodies inter alia, passenger information panels, network sensors, connected cars, dynamic traffic lights, GPS tracked public transportation, automatic number plate readers, navigation facilities, signaling systems and most importantly the ability to incorporate live data from most of these sources.



Fig. 5 Intelligent transport system interconnected

- 3) **Smart Energy:** One of the most important reasons for developing Smart cities is to move towards sustainable development and rising energy prices, depleting energy sources, energy theft and security are the key issues the city administrators are looking to resolve.

The theory of meeting energy needs in an environmentally sustainable manner keeping in mind the cost effectiveness brings up the term Smart Energy.

there are number of alterations in smart energy infrastructure, such as; microgrids, energy storage, smart appliances, smart grid technologies, distributed renewable generation, automated demand respond (ADR) and demand side alterations like smart appliances and electric vehicles.

Some of the prominent aspects of smart energy include 1) improved economics 2) lower cost

- 3) Cleaner environment 4) increased system efficiency.

- 4) **Smart Water Infrastructure:** Annually there are around 7 to 8 million people who die because of water related diseases and disasters. There are millions of people with no access to clean water. Lack of sanitation and the growing urbanization altogether leads to major challenges and problems in the city. Sewage Water Management (SWM) system increases reliability, makes it economically feasible and transparency of water distribution. It uses digital technology to save water wastage. The SWM system analyzes the available flow and the data related to pressure to determine anomaly like leak in real time to manage the water flow in a improved manner.

It can remotely diagnose problems and monitor the water utilities. It provides consumers information and tools for them so that they can make smart choices.

SWM system reduces maintenance cost, improve water security, improve water quality metrics and save water.

- 5) **Smart Waste Management:** According to a study by the World Bank waste generation is increasing at rate which is faster than that of urbanization. Efficient waste management improves the quality of life for its residents and leads to less health issues. Recycling, reuse and intelligent disposal have a positive impact on the city. Typically waste management includes monitoring, collection, transport, processing, recycling and disposal.

These systems decrease the wastage at source, classify waste at the source and create methods for proper usage of waste. Smart waste management technique is used for converting wastage into resource and creates closed loop economies.

It improves the efficiency of waste collection, separation, pickup, recycle and reuse.

- 6) **Smart Healthcare:** It refers to the provision of healthcare which help monitor the health conditions of citizens using intelligent and networked technologies. This system is changing the focus from cure to prevention. A wider view of overall care, wellness management and healthy living is taken into account.

A few examples of Smart Healthcare:

Smartphone applications, sensors and devices help patients collect data that can be used to monitor and support therapies.

Patients' health data can be collected remotely for diagnostic purpose.

Sensors can be used to determine 'blood glucose level' which can be seen on mobile phones.

Automatic health alerts can be provided to the patients' for health checkups and medication.

Smart Health care would provide a proper physician or medical diagnostics to people who may never have had access to one.

B. Digital infrastructure

Smart cities makes maximum use of all the interconnected information available to better control and understand the operation and make optimal use of the bounded resources available. Information and communication technology companies or ICTs play major role in this process; it enables the digital platform from which an information and knowledge network can be created. It helps in improving functioning of the city as a whole.

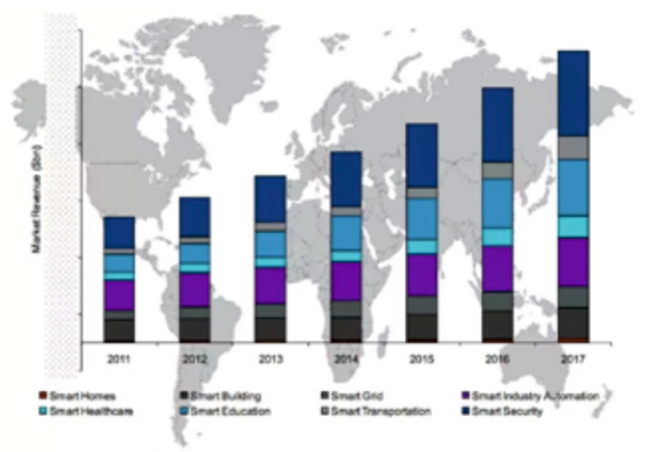


fig. 5 Smart cities market revenue 2011-2017

5. THE DRIVERS OF SMART CITIES

Smart cities help raise the liveability, workability and sustainability of the area. These are some of the reasons or drivers to make smart cities trend all over the world.

- 1) **Growing Urbanisation:** Smarter cities deliver greater employment opportunities, education, entertain, culture, easier access to healthcare and the arts. Due to this growth people are rapidly shifting bases from rural to urban areas.
- 2) **Rapidly Improving Technology:** Technology has made things easier. Developed countries are installing smart meters all over which collects the data of value to a smart city and timely delivers it.

- 3) **Rising Stress:** The challenges and problems from various issues like rise in population, increase in cost, unemployment, less time to spend with family, increase in crime rates have led to physical and psychological problems.
- 4) **Inadequate Infrastructure:** The rate at which urbanisation is increasing it is putting a lot of pressure on the infrastructure of the city. In most of the cases the infrastructure was built for a fraction of the current population.
- 5) **Growing Environmental challenges:** Half of the world population live in cities and use two thirds of the world's energy. Cities should discover to effectively lessen such environmental and climate change effects.
- 6) **Increasing Economic Competition:** There would be transition of workforce and people would move from one city to another due to increase in competitiveness in cities across the world to secure business, talent, jobs and investments.
- 7) **Rising Expectations:** People are getting used to instant information through mobile phones and computers, citizens want the same ease and accessibility from city services as well. ICTs play an important role in providing such types of services.

6. FUTURE OF SMART CITIES

With increase in urban population a lot of problems are arising due lack of physical and social infrastructure. The development planned through smart city mission in India takes care of these situations in certain selected cities. Innovative, new and smart ways to manage the complex situations of urban living, and problems starting from pollution, overcrowding, resource management rise in unemployment, environmental protection, and increasing crime rates. Cities like Barcelona and Seoul have already started taking advantage from the smart technology they are using which helps in proper governance of the city. Taking some other examples from different cities who are considered smart it is seen that it helps in a lot of ways and makes citizens lifestyle better. By the year 2020, the citizens of the city will start asking for smart cities which puts citizens first and give them a sustainable environment.

Smart cities promises economical, social and environmental sustainability. By the year 2030, all the major cities in the world will be on the path of becoming a smart city and existing smart cities will continue to develop physically and socially. New and innovative technologies would be used in these cities which will reduce wastage of natural resources. By the year 2050, green buildings would be a common scene and thus this would reduce the green house emissions to a great extent. Cities like Dholera and GIFT makes us confident that India is on the path of progress in the right direction. Smart cities have a great future and with India taking a bold step and making it a reality can only mean good for its citizens. With more than 100 cities selected it will take time but the result would worth waiting for.

Relatively some case studies show that the trends and infrastructure needed are provided very precisely so as to avail the facility to the citizens of city.

7. FINANCIAL SUPPORT FOR SMART CITIES IN INDIA

Developing smart city integration of central, state and urban bodies would be needed for successful completion. Funding for this project would be done through own sources, grants, Viability Gap Funding (VGF) and Public Private Partnership (PPP). The central government would provide each city its share of VGF allocated separately to it.

1. A sum of expenditure 60% would be invested in infrastructure.
2. E-governance would have a 10% of share.
3. The remaining share left over would be used in form of equity contributing it to government in two collaborated town ship projects in partnership with private and another in greenfield project & redevelopment project.

GOI has intended and suggested the cities to participate in the smart city project program and review their financial plan along with their SCDP and DPRs. These reports can be from various sources of number of government agencies and departments.

1. The city officials managements can rate the type of information capacity borrowed, having an parameter which would include the service levels, economic base and proposed investments of sustainability including user service charges.
2. It would also consist of financing and investment plans and strategy open to new financial accessing to market projects such as PPP.

Resources would be beneficiary when investments from not only domestic sector but from overseas it would be. Integration of multiple government budgets will be leveraged along with other overseas investors.

Initially, fund consultancy session would be done by GOI through other minis-

tries, bilateral, multilateral funding agencies and bank. Funds may be released from :

1. CGA (Central Government Access).
2. Lending from multi-lateral and bi-lateral agencies ,and ADB has also sanctioned to help India's smart cities programme.
3. State and national level land development agencies have also subscribed bond.

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